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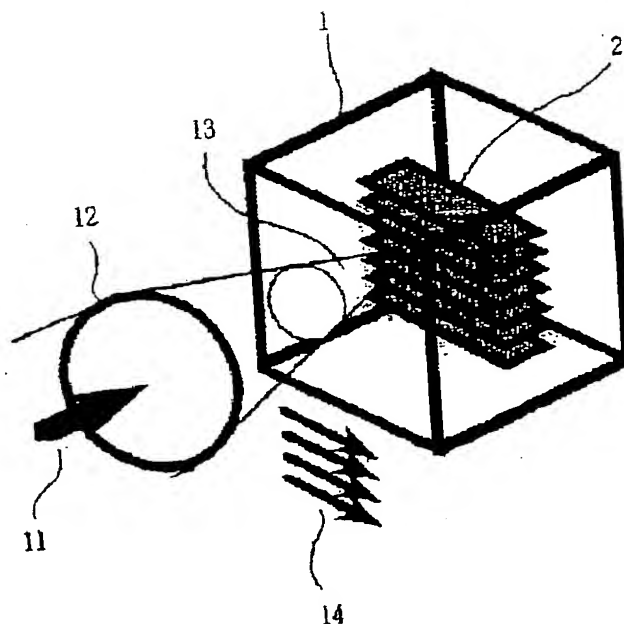
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APPLICANT : JAPAN SCIENCE & TECHNOLOGY  
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TITLE : THREE-DIMENSIONAL DIFFRACTION  
OPTICAL DEVICE AND ITS  
PRODUCTION



ABSTRACT : PROBLEM TO BE SOLVED: To provide a three-dimensional diffraction optical device capable of producing a diffraction optical device having high performance in optical glass by three-dimensionally distributing a permanent refractive index variation.

SOLUTION: A three-dimensional diffraction grating 2 as a three-dimensional refractive index distribution 13 to be written in optical glass 1 is generated by using a permanent refractive index variation or an optical damage caused by multiphoton absorption of an ultrashort pulse laser beam 11 having a pulse width of 1 nanosecond-1-femto-second and a wave length of 200 nm-2000 nm to the optical glass 1. By this method, the permanent refractive index variation is three-dimensionally distributed and a high performance diffractive optical element is produced in the optical glass. And the three-dimensional refractive index distribution can be generated, and by this degree of freedom e.g. an optionally shaped three-dimensional Bragg diffraction grating is designed by a computer and produced. furthermore and a symmetrical diffraction phenomenon and high diffraction efficiency being characteristics of a heaped type of diffraction grating are obtained.

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